MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
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SRM Number: 2723a
MSDS Number: 2723a
SRM Name: Sulfur in Diesel Fuel Oil

Date of Issue: 08 November 2003

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SECTION I. MATERIAL IDENTIFICATION

Material Name: Sulfur in Diesel Fuel Oil

Description: Diesel fuel is a middle distillate oil of low sulfur content and composed chiefly of unbranched paraffins. SRM 2723a is a commercial "No. 2-D" distillate fuel oil as defined by ASTM D 975-97 *Standard Specification for Diesel Fuel Oils*. A unit of SRM 2723a consists of 10 amber ampoules, each containing approximately 10 mL of diesel fuel.

Other Designations: Diesel Fuel Oil (Diesel Fuel Oil No. 2-D; Diesel Oil Medium; Diesel Fuel; Diesel Oil, Diesel Oil No. 2; Fuel Oil #2)

Name	Chemical Formula	CAS Registry Number
Diesel Fuel	complex mixture*	68476-34-6

DOT Classification: Not regulated by DOT

*A mixture of petroleum hydrocarbons (paraffinic, olefinic, naphthenic, and aromatic)

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Component	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Diesel Fuel Oil	~ 100	ACGIH TLV-TWA: 100 mg/m^3 (vapor) (skin)
		ACGIH TLV-TWA: 5mg/m^{3**}
		OSHA PEL: TLV-TWA: 5mg/m^{3**}
		NIOSH STEL: 10 mg/m^{3**}
		Rabbit, Skin: LD_{50}: >5 mL/kg
		Rat, Oral LD_{50}: 7.5 g/kg

**Limits set for mineral oil mists.

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Diesel Fuel	
Appearance and Odor: a clear brown bright liquid with a petroleum odor; slightly viscous	**pH:** not available
Density at (15 °C): 818.0 kg/m^3 *	**Vapor Pressure:** 1 mmHg @ 20 °C
Odor Threshold: not available	**Viscosity, Kinematic (at 40 °C):** 3.176×10^{-6} m$^{2/s}$*
Boiling Point (Range): 171 °C - 360 °C	**Vapor Density:** >1
Freezing Point: -18 °C	**Solubility in Water:** insoluble

* Values obtained from physical tests and measurements of SRM 2723a using ASTM methods, which were performed by a commercial firm under contract to NIST. These values are **NOT** certified and are provided as additional information.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: 88.9 °C* **Method Used:** ASTM D 93(A)-94 **Autoignition Temperature:** >246 °C

Flammability Limits in Air (Volume %): **UPPER:** > 6.0
LOWER: > 0.6

Extinguishing Media: Use a dry chemical powder, carbon dioxide, water, or foam. Use a water spray to cool fire exposed containers**. DO NOT** use a forced water stream directly into an oil fire as this will only scatter the fire; use a smothering technique for extinguishing the fire of this combustible liquid.

Special Fire Procedures: Diesel fuel oil is an OSHA Class II combustible liquid. Firefighters should wear a self-contained breathing apparatus (SCBA) operated in the pressure-demand or positive-demand mode and full protective clothing.

Unusual Fire and Explosion Hazards: Heating this material greatly increases the fire hazard. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

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SECTION V. REACTIVITY DATA

Stability: **X** **Stable** _____ **Unstable**

Conditions to Avoid: Avoid heat, flames, and sources of ignition.

Incompatibility (Materials to Avoid): Diesel fuel is incompatible with oxidizing materials; thermal oxidative reduction of diesel fuel oil can produce various hydrocarbons and hydrocarbon derivatives and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

Hazardous Polymerization _____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X **Inhalation** X **Skin** X **Ingestion**

Health Hazards (Acute and Chronic)
Inhalation of excessive concentrations of the vapor or mist can be irritating to the respiratory passages. Headache, dizziness, nausea, vomiting, and loss of coordination can result depending on the concentration and exposure time. When removed from the exposure area, the affected person usually recovers quickly.

Eye contact with diesel fuel may cause mild irritation. Exposure to the skin causes pain, redness, and irritation. Hair follicles may become irritated and the sebaceous glands can become blocked, producing a rash of acne pimples and spots, usually on the arms and legs. Repeated or prolonged exposure may cause defatting and drying of the skin resulting in irritation and *dermatitis.*

Ingestion of diesel fuel may cause nausea, vomiting, difficulty breathing, cramping, diarrhea, and possibly symptoms of central nervous system depression. Aspiration of even small amounts during ingestion or vomiting may result in severe pulmonary irritation with coughing, gagging, dyspnea, substenal distress and pneumonitis, pulmonary edema and hemorrhage, and death. The probable lethal dose in humans is 0.5 g/kg - 5 g/kg for a 68 kg (150 lbs) person.

Diesel fuel is noted as having inadequate evidence as a human carcinogen and as having limited animal evidence. Animal studies have confirmed an association between the induction of cancer, primarily of the lung, and inhalation exposure to whole diesel vapors exhaust. Limited epidemiologic evidence also suggests an association between occupational exposure to diesel engine emissions and lung cancer.

Although diesel fuel's toxicological effects should resemble kerosine's, they are somewhat more pronounced due to additives such as sulfurized esters.

Medical Conditions Generally Aggravated by Exposure: Not Available

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

*IARC classifies light distillate diesel fuel oils as Group 3 - unclassifiable as to carcinogenicity to humans.

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration by qualified personnel. Obtain medical assistance if necessary.

Ingestion: If ingested, wash out mouth with water. **DO NOT** induce vomiting. Contact medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: Central nervous system (CNS) and upper respiratory tract.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of leaks and spills. Remove sources of heat or ignition and provide adequate ventilation. Personnel performing the clean-up should use protection against contact with the liquid and vapor or mist inhalation. Small spills can be contained and absorbed by non-combustible materials, such as rags, straw, polyurethane foam, activated carbon, and sand. Collect spilled material in appropriate container for disposal. Clean up spills promptly to reduce fire or vapor hazards. Large diesel fuel oil spills must be reported to the authorities.

Waste Disposal: The material may be disposed of by a licensed waste disposal company, by controlled incineration, or burial in an approved landfill. Follow all federal, state, and local regulations.

Handling and Storage: Provide adequate ventilation where operating conditions (heating and spraying) may create excessive vapors and mists. Use explosion proof equipment. Provide approved respiratory apparatus for non-routine or emergency use. Use an approved filter and vapor respirator when vapor or mist concentrations are high. Wear protective rubber gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. Additional suitable protective clothing may be required depending on working conditions. An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water when working with this material. **DO NOT** smoke in areas of use.

> **NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store material in closed containers in a cool, dry, well-ventilated area away from sources of heat, sparks, open flames, and oxidizing agents and according to OSHA regulations. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Diesel Fuel No. 2*, 20 June 2003.

Disclaimer: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given only on the NIST Certificate of Analysis.